

# COOLING FAN PROVIDING ENHANCED HEAT DISSIPATING EFFECT

## FIELD OF THE INVENTION

5 The present invention relates to a cooling fan, blades of which are mounted in a frame at an inclined position relative to radiation fins located below the fan, so that airflows produced by the blades are directly continuously blown toward side surfaces of the radiation fins to accelerate the dissipation  
10 of heat transferred from an operating electronic element to the radiation fins.

## BACKGROUND OF THE INVENTION

15 While various kinds of electronic elements have been developed to have a compact and small volume and provide constantly increased working speed, they also produce a large amount of heat during operation. Therefore, it is always an important issue in the electronic industry to effectively dissipate heat  
20 produced by the electronic elements, lest they should have degraded function or become damaged due to an overly high working temperature.

Figs. 1 to 3 illustrates a conventional cooling fan 11 and  
25 a radiator 12. As shown, the cooling fan 11 includes a plurality of blades 111 mounted in a frame 112. The radiator 12 is connected to a top of an electronic element 13, and includes a plurality of radiation fins 12, to a top of which the cooling fan 11 is connected by means of fastening elements 112a. Heat  
30 generated by the electronic element 13 during operation thereof is transferred to the radiation fins 121 of the radiator 12 and is carried away by airflows produced by the blades 111

of the cooling fan 11 and downward blown toward narrow tops instead of wide side surfaces 121a of the radiation fins 121. Therefore, the heat transferred to the radiation fins 121 could not be effectively and quickly dissipated.

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It is therefore tried by the inventor to develop an improved cooling fan to eliminate the drawback existed in the conventional cooling fan, so as to effectively and quickly dissipate the heat produced by the electronic element.

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#### SUMMARY OF THE INVENTION

A primary object of the present invention is to provide a cooling fan that provides enhanced heat dissipating effect to effectively and quickly carry away heat produced by an electronic element.

To achieve the above and other objects, the cooling fan of the present invention includes a radiator having a plurality of radiation fins, and a fan connected to a top of the radiator. The fan includes a frame and a plurality of blades mounted in the frame at an inclined position relative to the top of the radiator. Therefore, airflows produced by the blades of the fan are directly continuously blown toward side surfaces of the radiation fins of the radiator to accelerate the dissipation of heat transferred from an operating electronic element to the radiation fins.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

The structure and the technical means adopted by the present invention to achieve the above and other objects can be best

understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings, wherein

5 Fig. 1 is an exploded perspective view of a conventional cooling fan;

Fig. 2 is an assembled perspective view of Fig. 1;

10 Fig. 3 shows directions of airflows produced by the cooling fan of Fig. 2;

Fig. 4 is an exploded perspective view of a cooling fan according to a first embodiment of the present invention;

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Fig. 5 is an assembled perspective view of Fig. 4;

Fig. 6 shows the directions of airflows produced by the cooling fan of Fig. 5;

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Fig. 7 is an exploded perspective view of a cooling fan according to a second embodiment of the present invention;

Fig. 8 is an assembled perspective view of Fig. 7;

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Fig. 9 shows the directions of airflows produced by the cooling fan of Fig. 8;

30 Fig. 10 is an exploded perspective view of a variant of the second embodiment of the present invention, in which a different mounting manner is provided;

Fig. 11 is a top view of a fan frame for the cooling fan of Fig. 10;

Fig. 12 is an assembled perspective view of the cooling fan  
5 of Fig. 10;

Fig. 13 is a top view of Fig. 12; and

Fig. 14 is a sectioned side view of Fig. 12.

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#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to Figs. 4 to 6 in which a cooling fan providing enhanced heat dissipating effect according to a first  
15 embodiment of the present invention is shown. As shown, the cooling fan mainly includes a fan 21 formed from a plurality of blades 211 and a frame 212, and a radiator 22 formed from a plurality of radiation fins 221. The frame 212 is provided at four corners with through holes 212a, via which fastening  
20 elements 212b are extended to lock the fan 21 to a top of the radiator 22. The radiator 22 is connected to a top of an electronic element 23 that generates heat during operation thereof.

25 As can be most clearly seen from Fig. 6, the fan 21 is mounted on the top of the radiator 22 with the blades 211 at an inclined position relative to the top of the radiator 22, so that the blades 211 face toward side surfaces 221a of the radiation  
30 fins 221. Heat generated by the electronic element 23 during operation thereof is transferred to the radiation fins 221 of the radiator 22. Since the blades 211 of the fan 21 are directly faced toward the side surfaces 221a of the radiation

fins 221, airflows produced by the rotating fan 21 are kept blown toward the side surfaces 221a to more quickly dissipate the heat transferred to the radiation fins 221. Therefore, the fan 21 with inclined blades 211 enables the cooling fan of the present invention to have increase efficiency in carrying away heat produced by the electronic element 23 and transferred to the radiation fins 221.

Figs. 7 to 9 illustrates a second embodiment of the present invention. In the second embodiment, the cooling fan mainly includes a fan 31 formed from a plurality of blades 311 and a frame 312, and a radiator 32 formed from a plurality of radiation fins 321. The frame 312 of the fan 31 has a triangular cross section, so that the blades 311 mounted in the frame 312 are at an inclined position relative to a top of the radiator 32. The frame 312 is provided at outer sides of two lower ends 312a with two slide ways 312b, and the radiator 32 is provided at upper ends of two outmost radiation fins 321 with two inward projected rails 321a corresponding to the two slide ways 312b on the frame 31. The radiator 32 is connected to a top of an electronic element 33 that generates heat during operation thereof.

The fan 31 is mounted on a top of the radiator 32 through engagement of the slide ways 312b on the frame 312 with the rails 321a on the two outmost radiation fins 321 of the radiator 32. Since the frame 312 of the fan 31 has a triangular cross section, the blades 311 are at an inclined position relative to the top of the radiator 32 to face toward side surfaces 321b of the radiation fins 321 when the fan 31 is mounted on the top of the radiator 32.

Please refer to Fig. 9. Heat generated by the electronic element 33 during operation thereof is transferred to the radiation fins 321 of the radiator 32. Since the blades 311 of the fan 31 are directly faced toward the side surfaces 321a of the radiation fins 321, airflows produced by the rotating fan 31 are kept blown toward the side surfaces 321a to more quickly dissipate the heat transferred to the radiation fins 321. Therefore, the fan 31 with inclined blades 311 enables the cooling fan of the present invention to have increase efficiency in carrying away heat produced by the electronic element 33 and transferred to the radiation fins 321.

Figs. 10 to 14 illustrates a variant of the second embodiment of the present invention. As shown, in the variant of the second embodiment, the frame 312 of the fan 31 is provided at predetermined positions corresponding to the two outmost radiation fins 321 with through holes 41, via which fastening elements 42 are screwed into the radiation fins 321 to lock the fan 31 to the top of the radiator 32.

The present invention has been described with some preferred embodiments thereof and it is understood that many changes and modifications in the described embodiments can be carried out without departing from the scope and the spirit of the invention that is intended to be limited only by the appended claims.